

based upon debug activities for the debuggable entity, intervening in interaction between the mixed-language script and the features of the host, wherein the debugging environment coordinates implementation of a first debug activity according to the first language, and wherein the debugging environment coordinates implementation of a second debug activity according to the second language.

19. A computer readable medium storing instructions for causing a computer programmed thereby to perform the method of claim 18.
20. The method of claim 18 wherein the debug activities include evaluating an expression.
21. The method of claim 18 wherein the debug activities include retrieving stack frame information.
22. The method of claim 18 wherein the debug activities include browsing a structured object.
23. The method of claim 18 wherein the debug activities include setting a breakpoint in the mixed-language script.
24. The method of claim 18 wherein the host is a web browser, and wherein the mixed-language script further interacts with features of a remote host.
25. The method of claim 18 wherein language-independent descriptions specify the debug activities.

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26. In a computing environment, a system for debugging mixed-language script that interacts with features of a host through a programming interface, the system comprising:

a debuggable entity created from mixed-language script and context information, the mixed-language script for interacting with features of a host through a programming interface exposed by the host, the mixed-language script including a first script portion written in a first language and a second script portion written in a second language; and

a debugging environment for debugging the mixed-language script by intervening in interaction between the mixed-language script and the features of the host, the debugging based upon debug activities for the debuggable entity, wherein the debugging environment coordinates implementation of a first debug activity according to the first language in the debugging, and wherein the debugging environment coordinates implementation of a second debug activity according to the second language in the debugging.

27. In a distributed computing environment, a method of facilitating the debugging of mixed-language script that interacts with features of a web browser and with features of a remote host, the method comprising:

providing a debugging environment for debugging mixed-language script that interacts with features of a web browser and with features of a remote host, the mixed-language script including a first script portion written in a first language and a second script portion written in a second language;

recognizing a debuggable entity created from the mixed-language script and context information;

based upon debug activities for the debuggable entity, intervening in interaction between the mixed-language script, the features of the web browser, and the features of the remote host, wherein the debugging environment coordinates implementation of a first debug activity according to the first language, and wherein the active debugging environment coordinates implementation of a second debug activity according to the second language.

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28. A computer readable medium storing instructions for causing a computer programmed thereby to perform the method of claim 27.

29. The method of claim 27 wherein language-independent descriptions specify the debug activities.

30. The method of claim 27 wherein the debug activities include evaluating an expression, retrieving stack frame information, browsing a structured object, and setting a breakpoint in the mixed-language script.

31. In a computing environment, a system for debugging mixed-language script, the system comprising:

a language-independent host for hosting mixed-language script that interacts with features of the host, the mixed-language script including a first script portion written in a first language and a second script portion written in a second language;

plural host-independent language engines, each language engine for handling language-dependent execution and debugging implementation according to a language present in the mixed-language script;

a language-independent, host-independent debugging environment, wherein the debugging environment facilitates debugging of the mixed-language script in a language-independent, host-independent manner.

32. The system of claim 31 wherein the debugging environment coordinates debugging of a virtual application based upon the mixed-language script and context information, and wherein the debugging environment maintains a catalog of language components in the virtual application.

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33. The system of claim 31 wherein the plural language engines include a first language engine for an interpreted language and a second language engine for a compiled language.

34. The system of claim 31 wherein each language engine handles language-dependent debugging for the language of the language engine.

35. The system of claim 31 further comprising:
a language-independent, host-independent debugging user interface for displaying debugging information for the mixed-language script as a virtual application.

36. The system of claim 31 wherein the language-independent host is a web browser.

37. A computer readable medium having stored thereon instructions, the instructions for causing a computer programmed thereby to perform a method of facilitating debugging of mixed-language script in a language-independent debugging environment, the method comprising:
receiving a language-independent description of a debugging activity related to mixed-language script that interacts with features of a host, the mixed-language script including a first script portion written in a first language and a second script portion written in a second language;
coordinating implementation of the debugging activity through a language engine that handles language-dependent execution and debugging for the debugging activity.

38. The computer readable medium of claim 37 wherein the method further comprises:
in a user interface, presenting results from the language engine in a language-independent manner.

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39. The computer readable medium of claim 37 wherein the method further comprises:
in a user interface, presenting a virtual application for debugging by a user.
40. The computer readable medium of claim 37 wherein the debugging activity comprises
evaluating an expression.
41. The computer readable medium of claim 37 wherein the debugging activity comprises
retrieving stack frame information.
42. The computer readable medium of claim 37 wherein the debugging activity comprises
browsing a structured object.
43. The computer readable medium of claim 37 wherein the debugging activity comprises
setting a breakpoint in the mixed-language script.
44. The computer readable medium of claim 37 wherein the host is a web browser, and
wherein the mixed-language script also interacts with features of a remote host.
45. The computer readable medium of claim 37 wherein the mixed-language script interacts
with features of the host through a programming interface exposed by the host.
46. The computer readable medium of claim 37 wherein language-independent description is
received through a language-independent, host-independent debugging user interface.

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47. The computer readable medium of claim 46 wherein the language-independent, host-independent debugging user interface displays debugging information for the mixed-language script as a virtual application.

48. In a computing environment, a method of aggregating stack frames from language engines for different languages, the method comprising:

requesting a first language engine to enumerate first contents of a first stack frame, the first language engine supporting language-dependent implementation according to a first language; the first contents including first language-dependent stack frame information;

requesting a second language engine to enumerate second contents of a second stack frame, the second language engine supporting language-dependent implementation according to a second language, the second contents including second language-dependent stack frame information; and

aggregating the first contents and the second contents.

49. The method of claim 48 wherein the first and second language engines return language-dependent stack frame information in a language-independent manner.

50. A computer readable medium storing instructions for causing a computer programmed thereby to perform the method of claim 48.—

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